

Two new species of *Morinda* L. (Rubiaceae) from north-east Queensland

D.A.Halford¹ & A.J.Ford²

Summary

Halford, D.A. & Ford, A.J. (2009). Two new species of *Morinda* L. (Rubiaceae) from north-east Queensland. *Austrobaileya* **8**(1): 81–90. *Morinda constipata* Halford & A.J.Ford and *Morinda retropila* Halford & A.J.Ford are described, illustrated and diagnosed against allied species. Notes on habitat, distribution, and conservation status are provided.

Key Words: *Morinda constipata*, *Morinda retropila*, Rubiaceae, Australian flora, Queensland flora, taxonomy, new species

¹D.A.Halford, c/- Queensland Herbarium, Department of Environment and Resource Management, Brisbane Botanic Gardens, Mt Coot-tha Road, Toowong, Queensland 4066, Australia

²A.J.Ford, CSIRO, Sustainable Ecosystems, Tropical Forest Research Centre, PO Box 780, Atherton, Queensland 4883, Australia

Introduction

The genus *Morinda* L. comprises between 30 (Razafimandimbison *et al.* 2009) and 80 (Mabberley 1997) species mostly in the Old World tropics. Eight described species have been recognised for Australia (Halford & Ford 2004). In this paper we describe a further two new species of *Morinda* endemic to north-eastern Queensland.

The species here described as *Morinda retropila* Halford & A.J.Ford has been known in the past by the misapplied name *Morinda hypotephra* F.Muell. (= *Palmeria hypotephra* (F.Muell.) Domin) (Reynolds & Halford 1994, 1997). In 1999, the first author examined flowering and fruiting material of this species and considered it differed from *Morinda* in having pedicellate flowers arranged in fascicles at the branchlet nodes and simple drupaceous fruits. *Morinda* is traditionally circumscribed as having sessile flowers forming congested capitula and compound syncarpous drupaceous fruits (Bentham 1866; Backer & Bakhuizen van den Brink 1965; Verdcourt 1976; Smith 1988). Uncertainties regarding the circumscription of the genus *Morinda* and the authors' lack of knowledge of the morphological variation over the wider geographical range of the genus prevented the formal naming of the species. It has been most recently listed (at BRI) under the phrase

name Gen.(Aq124851) sp. (Boonjie L.J.Webb+ 6837A) (Forster & Halford 2007).

The other species here described as *Morinda constipata* was first known from a single flowering specimen collected in 1974 and was originally identified as *M. umbellata* L. Examination of targeted and recent more ample collections of flowering and fruiting material reveal that it is a new and undescribed species similar to Gen.(Aq124851) sp. (Boonjie L.J.Webb+ 6837A) in having flowers arranged in fascicles at the branchlet nodes. It has been listed (at BRI) under the phrase name *Morinda* sp. (Bellenden Ker W.Cooper+ 1526) (Forster & Halford 2007).

A recent molecular (*rps16* intron, *trnT-F* and *nrITS*) study (Razafimandimbison *et al.* 2009) of the Rubiaceae tribe *Morindeae* Miq. *s.s.* has inferred that *Morinda* as presently delimited is paraphyletic. The two new species here described form a small subclade with another two Australian endemic *Morinda* (*M. canthoides* (F.Muell.) Halford & R.J.F.Hend. and *M. jasmynoides* A.Cunn. ex Hook.) that is nested within a larger *Gynochthodes*–*Morinda* clade. Razafimandimbison *et al.* (2009) propose to recircumscribe the genus *Morinda* in a narrower sense and broaden the circumscription of *Gynochthodes* to include almost all lianescent *Morinda* species. Until this is formally published and for conformity we name the new species in *Morinda*.

Materials and methods

The study is based upon the examination of herbarium material from BRI and CNS (formerly QRS) with field observations by the second author. All specimens cited have been seen by one or both authors. Measurements of the floral parts and fruits are based on material preserved in 70% ethanol. Common abbreviations in the specimen citations are: L.A. (Logging Area), N.P.R. (National Park/Reserve), S.F.R. (State Forest Reserve) and T.R. (Timber Reserve). The abbreviation RE in the distribution and habitat notes refers to Regional Ecosystem, descriptions of which can be viewed at (in this case); www.epa.qld.gov.au/projects/redd/landzone.cgi?bioregion=7.

Extent of occurrence estimates were derived from the validation of original collection localities. These data points were loaded into ESRI ArcView 3.2 and the draw polygon feature was used to calculate the area between the points. The area of occupation estimates were principally derived from a digital Regional Ecosystem map supplemented by the second author's knowledge of vegetation types and habitats within the Wet Tropics bioregion (referred to as the Wet Tropics hereafter) (Environment Australia 2005).

Taxonomy

Morinda constipata Halford & A.J.Ford, **species nova** similis *M. canthoidi* (F.Muell.) Halford & R.J.F.Hend. et *M. retropila* Halford & A.J.Ford. Ab illa foliis chartaceis anguste ellipticis in ambitu apice longe acuminatis instructis (vice foliorum coriaceorum ovatorum usque oblongo-ovatorum in ambitu apice breviter acuminato instructorum) ramulis juvenibus glabris (non hispidulis) differt. A *M. retropila* caespodomatiis praeditis (vice domatorum carentium), caulibus glabris (vice pilorum retrorsorum in caulibus), pedicellis ovariisque glabris (vice pedicellorum ovariorumque pubescentium), plerumque drupis compositis syncarpis parata (vice semper drupae simplici) differt. Collectiones antea pro *M. umbellata* L. determinatae sunt autem ab illa capitulis 2- vel 3-floris in fasciculis axillaribus terminalibusve in pedunculis glabris 1–3 mm

longis portatis (vice capitulorum 5–6-florum in fasciculis terminalibus in pedunculis hispidulis 3–20 mm longis portatorum) differt. **Typus:** Queensland. COOK DISTRICT: National Park Reserve 904, Woornooran, just S of tower 9, Mt Bellenden Ker cableway, 17 October 2003, A. Ford AF4184 & J. Holmes (holo: BRI; iso: CNS; L, K, MEL, MO, NSW, SUNIV *distribuendi*).

Morinda sp. (Bellenden Ker) (Cooper & Cooper 2004: 446).

Morinda sp. (Bellenden Ker W.Cooper+ 1526) (Forster & Halford 2007: 177).

Morinda sp. 2 (Razafimandimbison *et al.* 2009: 881).

Wiry twining vine to 7 m high, androdioecious. Stems to 7 mm diameter. New growth pale green. Branchlets terete, glabrous. Leaves petiolate, opposite; stipules interpetiolar, sheathing, 2–3 mm long, produced into a narrow triangular lobe, glabrous, fragmenting as node thickens; petioles 3–7 mm long; blades discolorous, ± chartaceous and thin, narrow-elliptic, 6–9.5 cm long, 1.5–3.5 cm wide, glabrous; adaxial surface shiny, dark green; abaxial surface paler than adaxial surface; venation brochidodromous with 5–7 lateral veins per side of midvein, slightly raised on adaxial surface, prominent on abaxial surface; midvein conspicuously raised on adaxial surface, prominent on abaxial surface; interlateral venation raised on both surfaces; apex acuminate; base obtuse to acute; margins entire; tuft-domatia present in lateral vein axils on abaxial surface. Flowers usually 3 or 4-merous, bisexual or unisexual (male only), sessile, in 2 or 3-flowered capitula, the flowers joined by the base of the gynoecium or rarely pedicellate. Capitula pedunculate, in axillary or terminal clusters; peduncles 1–3 mm long, glabrous; bracts in connate pairs, cup-shaped, produced into a short triangular lobe, glabrous. Calyx tube truncate or irregularly dentate, 0.4–0.6 mm long, 1.6–1.7 mm across, green, glabrous. Corolla valvate, clavate in bud, deciduous, purplish in colour at base especially in bud and extending towards throat, otherwise white, glabrous on abaxial surface; tube 1.8–3 mm long, slightly widened at the apex, glabrous inside proximally,

densely hairy distally with simple hairs 0.7–0.8 mm long; lobes elliptic, spreading, recurved, 2.2–3.5 mm long, 1.7–2.4 mm wide, glabrous adaxially, acute at apex. Bisexual flowers: stamens exserted; filaments 0.5–0.6 mm long, adnate to corolla tube *c.* 0.8 mm below the sinuses of the corolla lobes; anthers dorsifixed, oblong, 1.1–1.4 mm long, dehiscing laterally; disc annular, entire, convex, *c.* 0.4 mm high, glabrous; ovary 2-celled, biovulate, with false septum in the upper part appearing to divide each cell into 2; style 2.5–2.7 mm long (excluding stigma), glabrous; stigma bifid, with spreading lobes 2.7–2.8 mm long, adaxial surface and margin papillate, abaxial surface glabrous. Male flowers: stamens exserted; filaments 0.8–1.2 mm long, inserted *c.* 0.9 mm below the sinuses of the corolla lobes; anthers dorsifixed, oblong, 1.9–2.1 mm long, dehiscing laterally; disc annular, entire, conical, *c.* 0.5 mm high, glabrous; ovary undeveloped and lacking functional ovules and style. Fruit a compound syncarpous drupe (rarely simple), subglobose, laterally compressed or shallowly 3-lobed (globose when simple), 6–7 mm long, 10–14 mm across (widest point) (simple drupes are *c.* 4.5 mm diameter), orange when ripe, persistent calyx tubes not prominent on surface, glabrous; pericarp thin and leathery; mesocarp fleshy, containing 8 to 12 (rarely 4) pyrenes. Pyrenes \pm obovoid, dorsiventrally compressed, 3.8–4 mm long, 3–3.3 mm wide, 1.9–2.1 mm thick, 1-seeded; endocarp cartilaginous, pale brown, \pm smooth, with basal marginal groove. Seeds obovate in outline, *c.* 3 \times 2.8 \times 1.5 mm; testa membranous, dark brown; endosperm corneous, \pm white; embryo *c.* 1.6 mm long, \pm straight; cotyledons thin, *c.* 0.5 mm long and 0.4 mm wide; radicle *c.* 1.1 \times 0.5 mm. Seedlings unknown. **Fig. 1.**

Additional selected specimens examined: Queensland. COOK DISTRICT. 50 [m] N of station at top of Bellenden Ker, May 2001, *Cooper & Cooper WWC1526* (BRI, CNS); N.P.R. 904, Wooroonooran, just S of tower 9, Mt Bellenden Ker Cableway, Oct 2003, *Ford AF4182 & Holmes* (BRI, CNS); *ditto loc.*, May 2003, *Ford AF3963 & Green* (BRI, CNS); Bellenden Ker Range, Oct 1974, *Hyland 7765* (BRI, CNS); S.F.R. 310 Bellenden Ker, Sep 1977, *Gray 695* (CNS); S.F.R. 310, Upper Goldsborough L.A., Sep 1976, *Dockrill 1285* (CNS); N.P.R. 904, Wooroonooran, steep slope off 'Donkey Track' off Russell River Track, Oct 2001, *Ford et al. AF2969* (BRI, CNS, NSW).

Distribution and habitat: *Morinda constipata* is endemic to the Wet Tropics in north-eastern Queensland, where it is known from three localities *c.* 18 km apart predominantly on the Bellenden Ker Range (Mt Bellenden Ker and Mt Bartle Frere), with an isolated occurrence in the headwaters of the Russell River (**Map 1**). On the Bellenden Ker Range it is recorded as growing in simple microphyll-notophyll vine fern thickets on a granitic substrate, whereas near the Russell River it occurs in complex notophyll rainforest on soil derived from mudstones. On the Bellenden Ker Range the stunted canopy is dominated by: *Acmena hemilampra* subsp. *orophila* B.Hyland, *Balanops australiana* F.Muell., *Cinnamomum propinquum* F.M.Bailey, *Elaeocarpus ferruginiflorus* C.T.White, *Leptospermum wooroonooran* F.M.Bailey and *Musgravea stenostachya* F.Muell. Common smaller trees and shrubs include: *Alyxia orophila* Domin, *Cyathea rebecca* (F.Muell.) Domin, *Hypsophila halleyana* F.Muell., *Laccospadix australasica* H.Wendl. & Drude, *Linospadix* spp., *Polyosma rigidiuscula* F.Muell. & F.M.Bailey ex F.M.Bailey, *Triunia montana* (C.T.White) Foreman and *Trochocarpa bellendenkerensis* Domin. Although the altitudinal range is 590–1560 m, the majority of collections and reliable recordings are from 1460–1560 m. The species association for the 590 m collection (*Ford et al. AF2969*) is completely different to the Bellenden Ker Range as the substrate is mudstone, and for these details see Halford & Ford (2009, this issue under *Coelospermum purpureum*).

Morinda constipata has been collected or reliably reported in the following REs: 7.12.19a (rarely), 7.12.20 (commonly) and 7.11.12a (rarely).

Phenology: Flowers have been recorded from September to November, whilst fruits have been recorded from May to July.

Affinities: *Morinda constipata* is morphologically similar to *M. canthoides* and *M. retropila*. *Morinda constipata* differs from the former in having chartaceous leaves that are narrow-elliptic in outline, with a long acuminate apex (versus coriaceous leaves that are ovate to oblong-ovate in outline, with a shortly acuminate apex for *M. canthoides*),

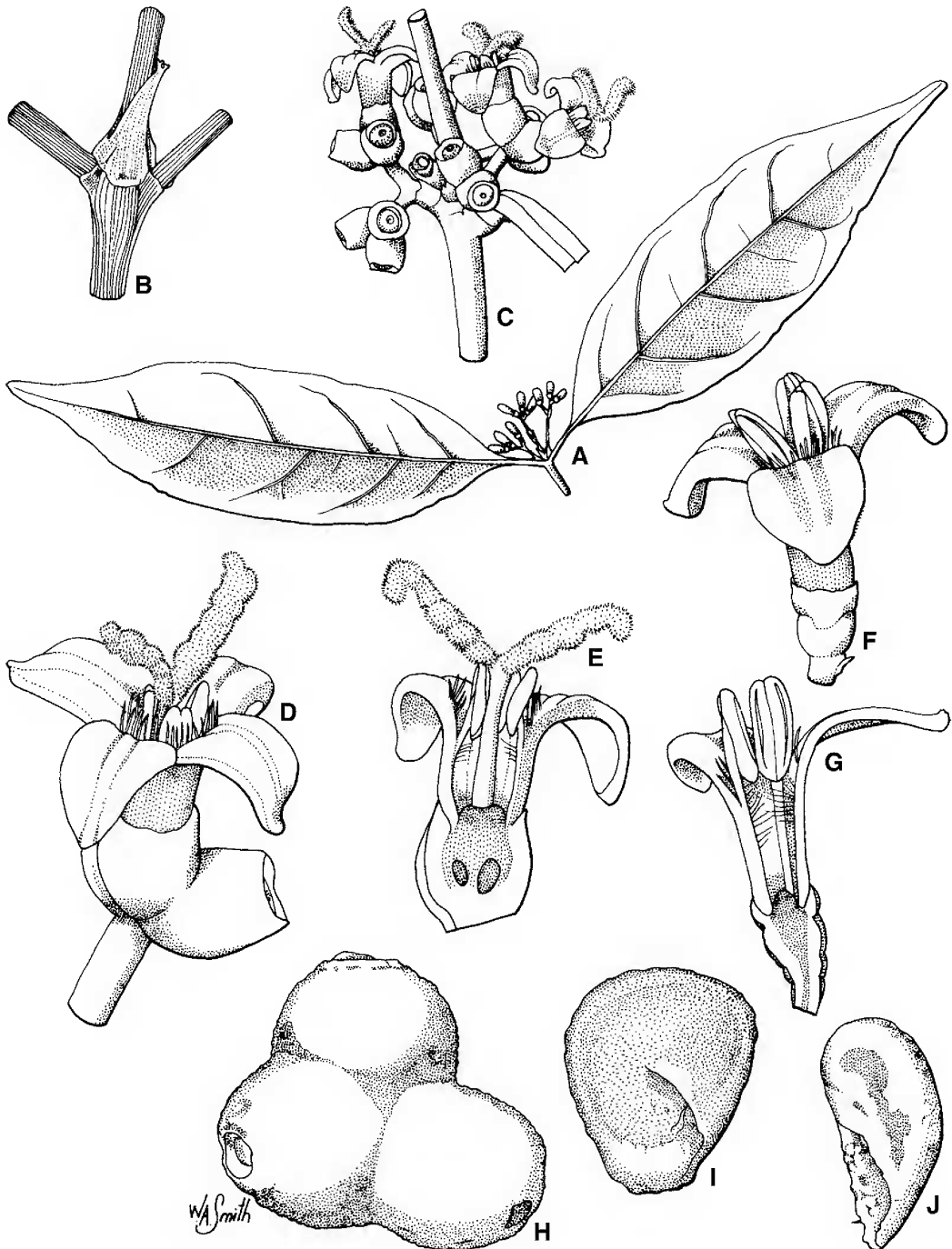


Fig. 1. *Morinda constipata*. A. branchlet with inflorescence $\times 1$. B. node with stipule $\times 6$. C. inflorescence $\times 3$. D. bisexual flower at anthesis $\times 8$. E. section of bisexual flower at anthesis $\times 8$. F. male flower at anthesis $\times 8$. G. section of male flower at anthesis $\times 8$. H. oblique view of fruit $\times 4$. I. adaxial view of pyrene $\times 8$. J. lateral view of pyrene $\times 8$. A, B, F, G from Ford AF4184 & Holmes (BRI); C–E from Ford AF4182 & Holmes (BRI); H–J from Cooper & Cooper WWC1526 (BRI). Del. W. Smith.

and young branchlets glabrous (versus mostly hispidulous for *M. canthoides*). *Morinda constipata* differs from *M. retropila* in having tuft-domatia (versus domatia absent for *M. retropila*), glabrous stems, (versus retrorse hairs on the stem for *M. retropila*), glabrous pedicels and ovary (versus hairy pedicels and ovary for *M. retropila*), and usually a compound syncarpous drupe (versus always a simple drupe for *M. retropila*). Collections of *M. constipata* have in the past been misidentified as *M. umbellata* but it differs from that in having 2 or 3-flowered capitula in axillary or terminal clusters on glabrous peduncles 1–3 mm long (versus 5 or 6-flowered capitula in terminal clusters on hispidulous peduncles 3–20 mm long for *M. umbellata*).

Razafimandimbison *et al.* (2009) have inferred a close phylogenetic relationship between *Morinda constipata* and *M. jasminoides*. *Morinda constipata* is easily distinguished from that species in having tuft-domatia (versus crypt-type domatia for *M. jasminoides*), interlateral venation distinctly raised on both leaf surfaces (versus interlateral venation obscure or only slightly raised for *M. jasminoides*), flowers sessile in 2 or 3-flowered capitula or flowers pedicellate (versus flowers always sessile in 5 to 10-flowered capitula for *M. jasminoides*), and corolla tube 1.8–3 mm long (versus corolla tube 4–6 mm long for *M. jasminoides*).

Notes: *Morinda constipata* occupies a similar niche to *M. podistra* Halford & A.J.Ford, although these species have non-overlapping distributions. Both species flower and fruit in the understorey and the twining stems rarely, if ever, reach the low canopy. In addition, *M. constipata* like *M. podistra* produces locally dense masses of wiry twining stems.

Conservation status: *Morinda constipata* is known only from three locations and has an extent of occurrence of only 72 km², which would fit such criteria to be classified as (at least) Vulnerable (ICUN 2001). However, there is no evidence to support a decline in population sizes or extent, and no suggestion of human activities adversely affecting current populations. All existing collections of *M. constipata* have been made

in Wooroonooran National Park within the World Heritage Area of the Wet Tropics. *Morinda constipata* is not considered at risk or under threat at this time.

Etymology: The specific epithet is from Latin *constipatus*, crowded closely together, and refers to the flowers arranged in axillary and terminal clusters in this species.

Morinda retropila Halford & A.J.Ford, **species nova** similis *M. canthoidi* (F.Muell.) Halford & R.J.F.Hend. et *M. constipata* Halford & A.J.Ford. Ab ambobus pagina abaxiali folii pallenti et aliquantum crema differt; paginas abaxiales virides et *M. canthoides* et *M. constipata* habent. *M. retropila* foliis chartaceis anguste ellipticis vel anguste ovatis (vice foliorum coriaceorum ovatorum usque oblongo-ovatorum), venatione interlateralis obscura utrinque folii (vice venationis elevatae), domatiis in axillis venarum lateralium carentibus (vice domatiorum praesentium), ramulis juvenibus pilis retrorsis praeditis (vice pilorum patentium) a *M. canthoidi* differt. De proprietatibus quae distinguunt *M. retropilum* a *M. constipata* vide diagnosem *M. constipatae*. **Typus:** Queensland. COOK DISTRICT: Wooroonooran National Park, start of Bartle Frere walking track, 27 November 2001, P.I.Forster PIF27757 & A.M.Young (holo: BRI; iso: CNS *distribuendi*).

Morinda sp. (Boonjee) (Cooper & Cooper 1994: 194).

Rubiaceae gen. nov. sp. (Boonjee) (Cooper & Cooper 2004: 452).

Gen.(Aq124851) sp. (Boonjee L.J.Webb+ 6837A) (Forster & Halford 2007: 176).

Morinda sp. 1 (Razafimandimbison *et al.* 2009: 881).

Morinda hypotephra auct., non F.Muell. (Reynolds & Halford 1994: 297; Reynolds & Halford 1997: 182).

Illustrations: Cooper & Cooper (1994: 195), as *Morinda* sp. (Boonjee); Cooper & Cooper (2004: 452) as Rubiaceae gen. nov. sp. (Boonjee).

Slender twining, wiry vine, probably androdioecous. Stems pale, to 5 mm diameter. New growth pale green, slightly resinous. Young branchlets terete, moderately to densely hairy becoming glabrous with age; hairs simple, retrorse, 0.05–0.2 mm long; older branchlets rugose, glabrous, light grey. Colleters abundant at nodes of young branchlets inside at base of stipules; raphides abundant. Leaves petiolate, opposite; stipules interpetiolar, sheathing, 1.7–3 mm long, chartaceous, truncate, moderately hairy on abaxial surface with hairs as for branchlets, glabrous on adaxial surface, fragmenting as nodes thicken; petioles green when fresh, \pm terete, 4–10 mm long, moderately to densely hairy with spreading hairs up to 0.2 mm long; blades discolorous, chartaceous and thin, narrow-elliptic or narrow-ovate, 5.5–10 cm long, 2–4 cm wide, length/width ratio 2.5–4:1, adaxial surface glabrous, shiny, dark green; abaxial surface very pale and somewhat creamish in colour, sparsely hairy with spreading hairs up to 0.2 mm long; venation brochidodromous with 4–8 lateral veins per side of midvein; midvein conspicuously raised on adaxial surface, prominent on abaxial surface; lateral venation \pm obscure on adaxial surface, raised on abaxial surface; interlateral venation \pm obscure on both surfaces; apex usually acuminate with acumen up to 1.5 cm long or rarely acute; base obtuse to rounded or abruptly cuneate; margins entire; domatia absent. Inflorescences 2 or 3-flowered umbel-like cymes; cymes shortly pedunculate, axillary, 1 to many per node; peduncles 0.5–0.8 mm long; bracts in connate pairs, cup-shaped, truncate, up to 1 mm long, whitish, sparsely hairy abaxially with spreading hairs up to 0.1 mm long. Flowers pedicellate (simple and not sessile in capitula), 3–5 (mostly 4)-merous, bisexual or possibly unisexual on separate plants; pedicels terete, 1–4 mm long, hispidulous with hairs $<$ 0.1 mm long. Calyx tube 0.5–0.8 mm long, 1.5–1.7 mm wide, hispidulous on abaxial surface. Corolla valvate, clavate in bud with 3 or 4 short protuberances apically, deciduous; tube 2.9–3 mm long widening distally, minutely hairy abaxially, densely hairy in throat with long ascending hairs, 0.4–1.3 mm long; lobes triangular, 2–2.6 mm long, 1.5–2.2 mm wide

recurved; adaxial surface minutely papillose, with median longitudinal ridge; abaxial surface smooth and glabrous; apex inflexed. Disc annular, convex, *c.* 0.4 mm long, glabrous. Ovary bilocular; ovules 2 in each locule, with false septum in the upper part appearing to divide each into 2, funicle inserted at base of dissepiment. Bisexual flowers: stamens inserted in throat of corolla tube; staminal filaments 0.5–0.8 mm long, adnate to corolla tube 2–2.5 mm below the sinuses of the corolla lobes; anthers 1.6–1.9 mm long; styles 3.6–4.6 mm long (including stigma), exerted from corolla tube; stigma bifid, 0.5–1.4 mm long, \pm erect, upper surface papillose, lower surface smooth. Unisexual flowers: stamens inserted in corolla tube; staminal filaments 0.8–1 mm long, adnate to corolla tube 1.5–1.8 mm below the sinuses of the corolla lobes; anthers 1.5–2.2 mm long; style absent, stigma bifid, 0.3–0.6 mm long, erect, subulate, glabrous. Fruit a simple drupe, subglobose, 5–10 mm long, 4.5–9 mm across, umbilicate, orange when ripe, glabrous; pericarp thin; mesocarp fleshy, containing up to 4 pyrenes. Pyrenes \pm ellipsoid in outline, 3-sided, 2.4–3 mm long, 2.2–2.6 mm wide, 1.4–1.6 mm thick, 1-seeded; endocarp cartilaginous, pale brown, \pm smooth, with basal marginal groove. Seeds elliptic in outline, 2.3–2.5 mm long, 1.8–1.9 mm wide, 0.8–1 mm thick; testa membranous, pale brown; endosperm corneous, \pm white; embryo *c.* 1.4 mm long, \pm straight; cotyledons thin, *c.* 0.5 mm long and 0.5 mm wide; radicle *c.* 0.9 \times 0.4 mm. Germination epigeal (phanerocotylar); cotyledons ovate-reniform, 7–9 mm long, 6–9 mm wide, apex obtuse or bluntly pointed, base attenuate-auriculate.

Fig. 2.

Additional selected specimens examined: Queensland. COOK DISTRICT: N.P.R. 133, Mt Sorrow Ridge walking track, Nov 2000, *Ford AF2527 et al.* (BRI); Mt Edith Road, off Danbulla Forest Drive, Apr 2004, *Bradford 3* (BRI, CNS); T.R. 1230, Boonjee L.A., SE of Butchers Creek township, Nov 1988, *Jessup G.JM5204 et al.* (BRI); N.P.R. 904, Wooroonooran, *c.* 300 m along track to Mt Bartle Frere, Apr 2004, *Bradford 2* (BRI); Wooroonooran N.P., Bartle Frere track before Bobbin Bobbin Falls, Oct 1997, *Forster PIF21748 et al.* (BRI, CNS); property of W. & W. Cooper, Topaz, Nov 2005, *Halford Q8853 & Jensen* (BRI); vacant crown land, Bartle Frere E of Glen Allyn Trig., Feb 1962, *Webb & Tracey 5794* (BRI); Boonjee, W of Mt Bartle Frere, 1962, *Webb & Tracey 6837A* (BRI); Foot of Bartle Frere, 1 km ESE of Josephine falls, Aug

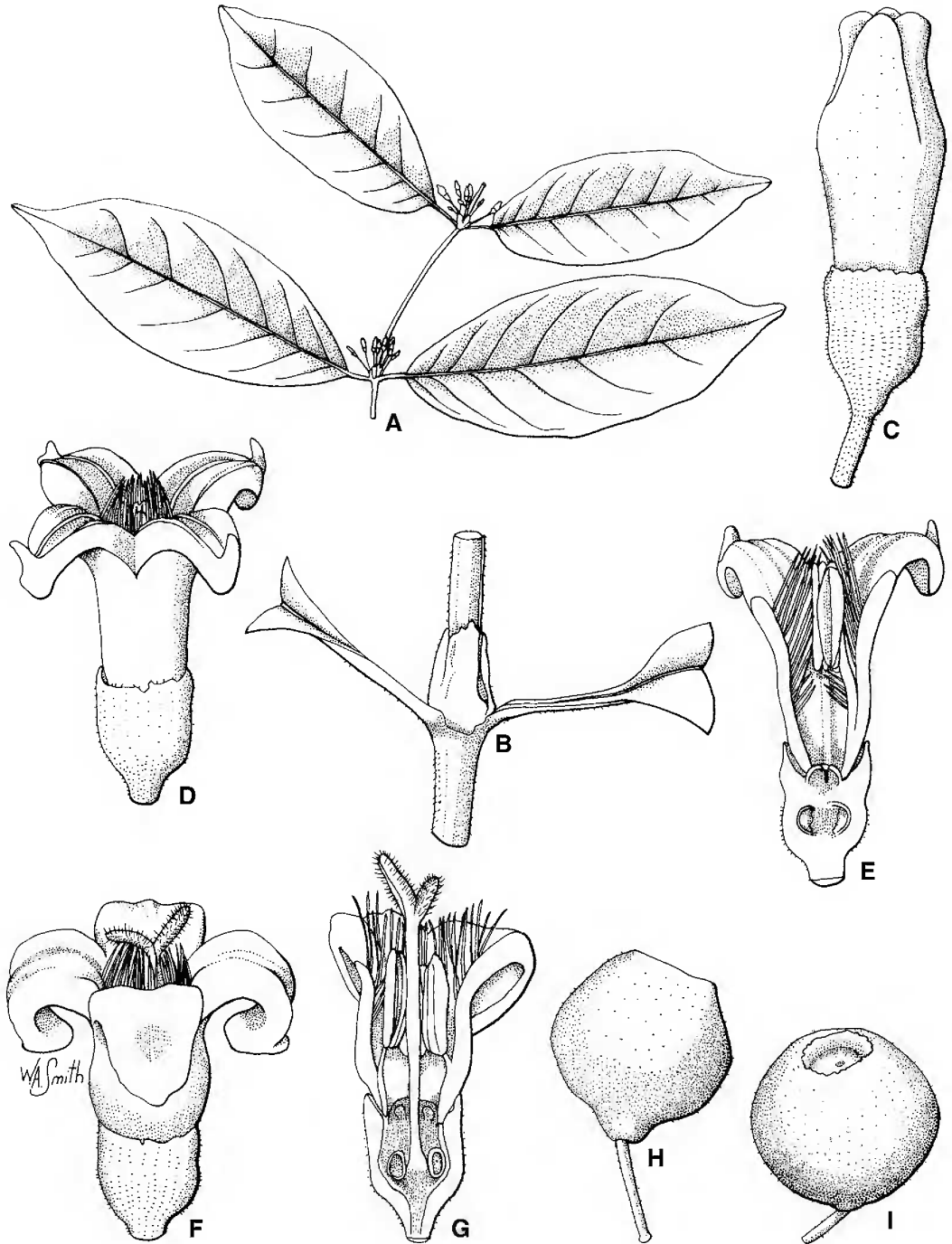


Fig. 2. *Morinda retropila*. A. branchlet with inflorescences $\times 0.4$. B. node with stipule $\times 8$. C. flower bud $\times 8$. D. unisexual flower (short styled) at anthesis $\times 8$. E. section of unisexual flower (short styled) at anthesis $\times 8$. F. bisexual flower (long styled) at anthesis $\times 8$. G. section of bisexual flower (long styled) at anthesis $\times 8$. H. lateral view of fruit $\times 4$. I. oblique view of fruit $\times 4$. A from Forster PIF21748 *et al.* (BRI); B, F, G from Forster PIF26530 & Booth (BRI); C–E from Cooper WWC1620 (BRI); H, I from Bradford 2 (BRI). Del. W.Smith.

2000, *Lyons 203* (BRI, CNS); S.F.R. 755, Gosschalk L.A., E.P./34, Nov 1976, *Fitzsimon 241* (CNS); Topaz, Towalla road, Nov 2001, *Cooper WWC1620* (BRI, CNS); Towalla, Coolamon Creek, May 2002, *Booth 3113 & Jensen* (BRI); N.P.R. 904, Wooroonooran, c. 700 m S of Towalla Mine, along old logging track, Oct 2001, *Ford AF3029 et al.* (BRI); S.F.R. 650, Mt Fisher, c. 400 m SE of peak “1230”, Nov 2002, *Ford AF3683* (CNS); 6 km SSW of Millaa Millaa, end of Whiting road, property D. & S. Clague, Dec 2000, *Forster PIF26530 & Booth* (BRI). NORTH KENNEDY DISTRICT: S.F.R. 251, Koolmoon L.A., 1.5 km S of Coochimbeerum road, May 2001, *Ford AF2861* (BRI); S.F.R. 251, Koolmoon L.A., 1.5 km S of Coochimbeerum road, off Tully Falls road, Koolmoon Creek, Nov 2002, *Ford AF3700 & Holmes* (BRI, CNS); Tableland L.A., 0.5 km S of Koolmoon Creek near junction of Ebony road and Tully Falls road, 6 km NW of Tully Falls, Oct 1988, *Jessup GJM2666 et al.* (BRI).

Distribution and habitat: *Morinda retropila* is endemic to the Wet Tropics in north-eastern Queensland. It is currently known to occur from the Danbulla area on the Lamb Range to the Tully Falls area on the southern edge of the Atherton Tableland, with disjunct populations near Cape Tribulation (Mt Sorrow) and on the eastern foothills of Mt Bartle Frere (**Map 2**). It is recorded as growing in the wetter, simple to complex notophyll vine forest or complex mesophyll vine forest on substrates which range from basalt, mudstone, granite and rhyolite to granitic alluvium. Occurrences on rhyolite, granite, granitic alluvium and mudstone are less common, with *M. retropila* being most common on basalt. Common canopy trees on basaltic substrates include: *Beilschmiedia bancroftii* (F.M.Bailey) C.T.White, *Cardwellia sublimis* F.Muell., *Castanospora alphanthii* (F.Muell.) F.Muell., *Cryptocarya oblata* F.M.Bailey, *Doryphora aromatica* (F.M.Bailey) L.S.Sm., *Elaeocarpus largiflorens* C.T.White subsp. *largiflorens*, *Endiandra bessaphila* B.Hyland, *Ficus pleurocarpa* F.Muell., *Franciscodendron laurifolium* (F.Muell.) B.Hyland & Steenis and *Opisthiopsis heterophylla* L.S.Sm. Common small trees and shrubs on basaltic substrates include: *Antirhea tenuiflora* F.Muell. ex Benth., *Apodytes brachystylis* F.Muell., *Atractocarpus hirtus* (F.Muell.) Puttock, *Bubbia semecarpoides* (F.Muell.) B.L.Burt, *Irvingbaileya australis* (C.T.White) R.A.Howard, *Niemeyera prunifera* (F.Muell.) F.Muell., *Pilidiostigma tetramerum* L.S.Sm., *Symplocos hayesii* C.T.White & W.D.Francis and *Wilkiea angustifolia* (F.M.Bailey)

J.R.Perkins. Although the altitude range is 120–1200 m, *M. retropila* appears to be more common in the 600–1000 m band.

Morinda retropila has been collected or reliably reported in the following REs: 7.3.10a (rarely), 7.3.36a (rarely), 7.8.1a (rarely), 7.8.2a (commonly), 7.8.4a (commonly), 7.11.12a (occasionally), 7.12.1a (rarely), 7.12.16a (occasionally).

Phenology: Flowers have been recorded from October to January, whilst fruits have been recorded from February to July.

Affinities: *Morinda retropila* is morphologically similar to *M. canthoides* and *M. constipata*. *Morinda retropila* differs from both in having a very pale and somewhat creamish in colour abaxial leaf surface. Both *Morinda canthoides* and *M. constipata* have green abaxial surfaces. *Morinda retropila* differs from the former in having chartaceous leaves that are narrow-elliptic or narrow-ovate (versus coriaceous leaves that are ovate to oblong-ovate for *M. canthoides*), interlateral venation obscure on upper and lower leaf surfaces (versus interlateral venation raised for *M. canthoides*), domatia lacking in axils of lateral veins (versus domatia present for *M. canthoides*) and young branchlets with retrorse hairs (versus spreading hairs for *M. canthoides*). For features distinguishing *M. retropila* from *M. constipata*, refer to the ‘Affinities’ section under that species.

Razafimandimbison *et al.* (2009) have inferred a close phylogenetic relationship between *Morinda retropila* and *M. jasminoides*. *Morinda retropila* is easily distinguished from that species by having pedicellate flowers arranged in fascicles at the branchlet nodes (versus flowers always sessile in 5 to 10-flowered pedunculate capitula arranged in terminal and axillary umbels for *M. jasminoides*), simple drupaceous fruits (versus compound syncarpous drupe for *M. jasminoides*), corolla tube c. 3 mm long (versus corolla tube 4–6 mm long for *M. jasminoides*), domatia lacking in axils of lateral veins of leaves (versus crypt-type domatia for *M. jasminoides*).

Notes: The flowers from the collections Cooper WWC1620, Forster PIF27757 and Forster PIF21748 *et al.* are interpreted as being unisexual as they have pollen producing anthers but have a style reduced to two small subulate stigmatic lobes that only just extend beyond the annular disk, although the ovary is well developed with what appear to be functional ovules. The flowers from collections Ford AF3029 *et al.* and Forster PIF26530 & Booth appear to be bisexual with a well developed style, stigma, ovary and pollen producing anthers. Further flowering material and field investigations are required to assess what reproductive strategies are present in this species. This is a similar floral arrangement as reported in *Morinda podistra* (Halford & Ford 2004).

Recently expanded leaves have a velvet-like appearance on the adaxial surface, even though the surface is glabrous. It has been described as having a taffeta-like shine (Cooper & Cooper 2004: 452).

Conservation status: Most existing collections of *Morinda retropila* have been made within the World Heritage Area of the Wet Tropics. It has been collected in Daintree, Wooroonooran, Tully Falls, Maalan and Danbulla National Parks. *Morinda retropila* has an extent of occurrence estimated to be no less than 1550 km² and occurs over a large, but narrow, geographical area. Accordingly it is not considered at risk or under threat at this time.

Etymology: The specific epithet is from Latin *retro*, backward, and *pilus* hair in reference to the retrorse hairs on the branchlets of this species.

Acknowledgements

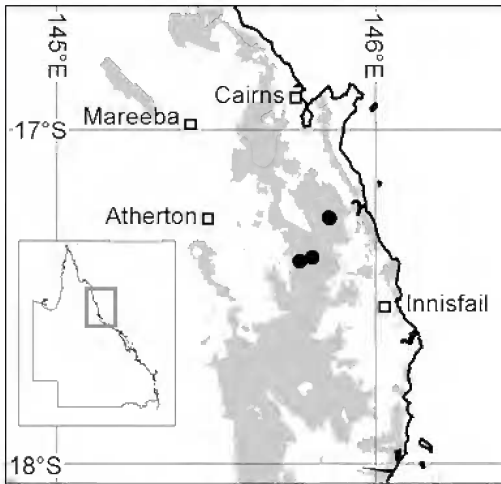
The authors wish to thank Will Smith for the illustrations, Peter Bostock for providing the distribution maps and Les Pedley the translation of the diagnoses into Latin. Wendy Cooper and Matt Bradford collected critical material for interpretation and illustrations. Spiro Buhagiar of Transmission Holding Limited Australia (THL) is warmly thanked for facilitating access to *Morinda constipata* populations on Mt Bellenden Ker. Permits to

collect in the Wet Tropics were issued by the Department of Environment and Resource Management (formerly EPA). The curators and staff at BRI and CNS (formerly QRS) are thanked for allowing access to specimens and the use of their facilities.

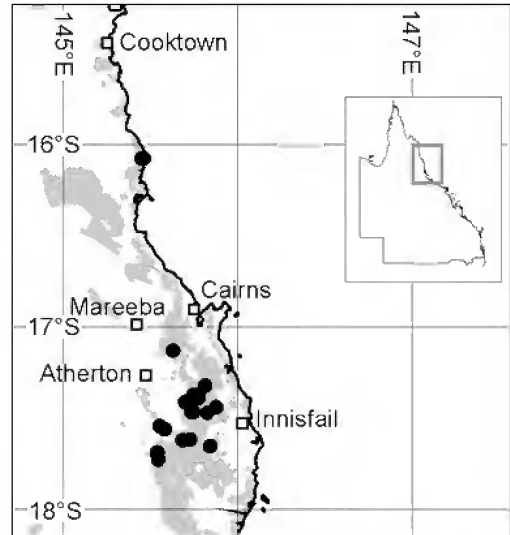
References

- BACKER, C.A. & BAKHUIZEN VAN DEN BRINK JR., R.C. (1965). *Morinda*. In *Flora of Java 2*: 349–351. N.V.P. Noordhoff: Groningen, The Netherlands.
- BENTHAM, G. (1866). *Morinda*. In *Flora Australiensis 3*: 423–424. L.Reeve: London.
- COOPER, W. & COOPER, W.T. (1994). *Fruits of the Rainforest*. Geo Productions: Chatswood, Sydney.
- (2004). *Fruits of the Australian Tropical Rainforest*. Nokomis Editions: Melbourne.
- ENVIRONMENT AUSTRALIA. (2005). Revision of the Interim Biogeographic Regionalisation for Australia (IBRA) and Development of Version 5.1 – Summary report (2000). Updated, IBRA Version 6.1 (Digital Data, metadata). [accessed 24 June 2009]. <http://www.environment.gov.au/parks/nrs/science/bioregion-framework/ibra/>.
- FORSTER, P.I. & HALFORD, D.A. (2007). Rubiaceae. In P.D.Bostock & A.E.Holland (eds.), *Census of the Queensland Flora 2007*, pp. 175–179. Environmental Protection Agency: Brisbane.
- HALFORD, D.A. & FORD, A.J. (2004). Two new species of *Morinda* L. (Rubiaceae) from north-east Queensland. *Austrobaileya* 6: 895–902.
- IUCN (2001). *IUCN Red List Categories: version 3.1*. IUCN Species Survival Commission. IUCN: Gland, Switzerland.
- MABBERLEY, D.J. (1997). *The Plant Book: A portable Dictionary of Higher Plants*. 2nd edn. Cambridge University Press: Cambridge.
- RAZAFIMANDIMBISON, S.G., McDOWELL, T.D., HALFORD, D.A. & BREMER B. (2009). Molecular phylogenetics and generic assesment in the tribe *Morindeae* (Rubiaceae): how to circumscribe *Morinda* L. to be monophyletic? *Molecular Phylogenetics and Evolution* 52: 879–886.
- REYNOLDS, S.T. & HALFORD, D.A. (1994). Rubiaceae. In R.J.F.Henderson (ed.), *Queensland Vascular Plants: names and distribution*, pp. 294–301. Queensland Herbarium, Queensland Department of Environment and Heritage: Brisbane.

- (1997). Rubiaceae. In R.J.F.Henderson (ed.), *Queensland Plants: names and distribution*, pp. 180–184. Department of Environment: Brisbane.
- SMITH, A.C. (1988). *Morinda*. In *Flora Vitiensis Nova*. 4: 332–341. Pacific Tropical Botanic Gardens: Lawai, Kauai, Hawaii.
- VERDCOURT, B. (1976). *Morinda*. In R.M.Polhill (ed.) *Flora of Tropical East Africa*. Rubiaceae (part 1): 145–149. Crown Agents for overseas Governments and Administrations: London.



Map 1. Distribution of *Morinda constipata* • in north-east Queensland. Shaded area on map indicates nature conservation reserves (National Parks, Forest Reserves and Conservation Parks).



Map 2. Distribution of *Morinda retropila* • in north-east Queensland. Shaded area on map indicates nature conservation reserves (National Parks, Forest Reserves and Conservation Parks).